Space Weather Forecast

Issued on Monday, 10 October 2022 at 01:18 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate-class X-ray flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with recorded X-ray activity confined to low common-class. The largest flare of the period was a middle-ranking common class flare at 09/2216UTC, emanating from a grwoing sunspot in the northeast - one of the most-changed groups in the period. Also of note was a slowly rising and falling middling common-class at 09/1427UTC, with this emanating from the largest and nominally most complex region on the Sun. This type of slow-burn flare has been typical of this sunspot group in recent days, with its apparent complexity not yet borne out in activity.

Including the above sunspot, there are five regions on the Sun, with another small group having become indistinct in the northwest in the period. All five sunspot groups showed some proliferation over the UTC day, although the more noteworthy groups were near centre-disc.

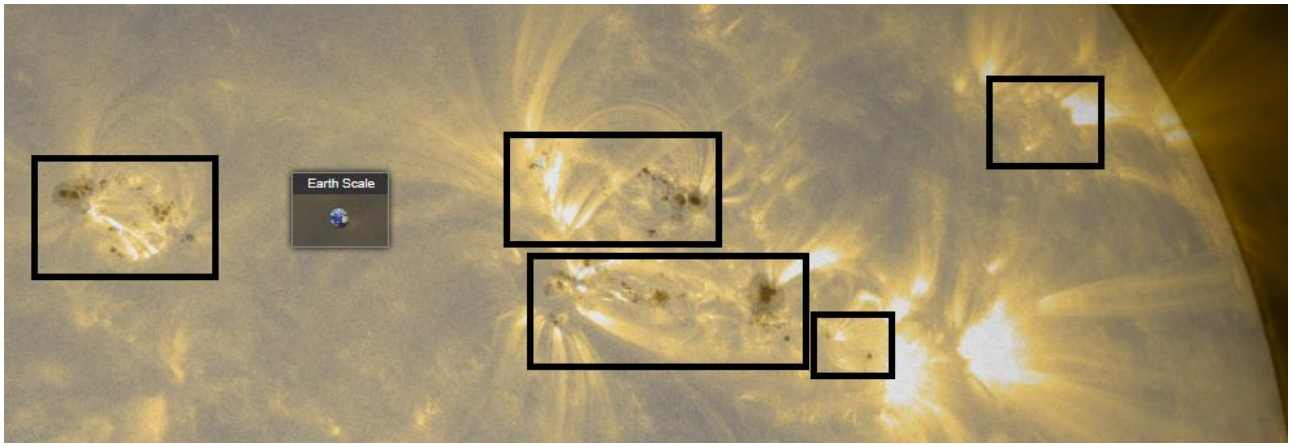

Figure 1: False-colour visible satellite imagery of the Sun at 09/2230UTC, with a proxy for magnetic field lines emanating from the main sunspot regions (boxed) also shown.

There are still a number of 'filaments' (arcs of plasma) on the Sun. One of these showed some movement in the south-central part of the facing side later in the UTC afternoon, but did not appear to leave the Sun (as a Coronal Mass Ejection (CME)). The main events visible on satellite imagery were a large southeast-directed CME (behind and below the track of the Earth's orbit), shortly followed by a rear-sided eastward emission, and then later a high latitude far-sided CME - none of which are expected to affect Earth. Finally, at the very end of the period, a disturbance in the central southeast quarter of the Sun may be related to a filament lift off. There is not yet any imagery to ascertain if any CME has resulted, however this will be monitored.

Solar Wind / Geomagnetic Activity: The solar wind was elevated, with a rising trend evident that

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may be mainly due to an otherwise seamless transition between 'coronal holes' (sources of the fast wind).

The solar wind speed rose in the period, with the number of particles comprising the solar wind slightly above the long-term background. These particles' associated magnetic field was within its typical background range, although the north-south component was mainly anti-aligned with Earth's field (to greater geomagnetic effect), with a more neutral variation then observed from 09/1900UTC.

The net result of the above solar wind measures was for provisionally quiet to active geomagnetic activity, peaking just below Minor Storm G1 in the 12-15UTC interval.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be low, but with a chance of rising to moderate. The outlook is for a greater chance of activity given far side soundings and bright flux over the eastern solar horizon, however the degree to which this manifests will be determined as and when any sunspot regions arrive. None of the more noteworthy groups on the Sun leave the western horizon in the four days. There is a flat daily chance of moderate-class flares.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs in the forecast, however the 07/0730UTC 'filament eruption' CME may pass close to the Earth overnight UTC 11 into 12 October, giving some very slight peripheral influences.

Otherwise, ongoing fast winds are likely to gradually ease through the period, approaching or falling to background by midweek UTC (12 October).

Energetic Particles / Solar Radiation: Solar radiation storms should be at background, but with a daily slight chance of rising in response to any large x-ray flares, primarily from the largest sunspot groups.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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